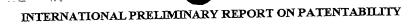# PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference	FOR FURTHER ACTION See Form PCT/IPEA/416	
800167FI		
International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/FI 2003/000499	18.06.2003	20.06.2002

International Patent Classification (IPC) or national classification and IPC

H03M 13/27

Applicant

NOKIA CORPORATION et al

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of ___6___ sheets, including this cover sheet.

3. This report is also accompanied by ANNEXES, comprising:

   a. ☐ *(sent to the applicant and to the International Bureau)* a total of _____ sheets, as follows:

   ☐ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).

   ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.

   b. ☐ *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s)) _____ , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

   ☒ Box No. I   Basis of the report

   ☐ Box No. II   Priority

   ☐ Box No. III   Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

   ☐ Box No. IV   Lack of unity of invention

   ☒ Box No. V   Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

   ☐ Box No. VI   Certain documents cited

   ☐ Box No. VII   Certain defects in the international application

   ☒ Box No. VIII   Certain observations on the international application

Date of submission of the demand	Date of completion of this report
16.01.2004	22.09.2004
Name and mailing address of the IPEA/SE	Authorized officer
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Form PCT/IPEA/409 (cover sheet) (January 2004)

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/FI 2003/000499

Box No. I . **Basis of the report**

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

    ☐ This report is based on a translation from the original language into the following language _____ , which is the language of a translation furnished for the purposes of:

    ☐ international search (under Rules 12.3 and 23.1(b))

    ☐ publication of the international application (under Rule 12.4)

    ☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the **elements** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report):*

    ☒ the international application as originally filed/furnished

    ☐ the description:

    pages _____ as originally filed/furnished

    pages* _____ received by this Authority on _____

    pages* _____ received by this Authority on _____

    ☐ the claims:

    pages _____ as originally filed/furnished

    pages* _____ as amended (together with any statement) under Article 19

    pages* _____ received by this Authority on _____

    pages* _____ received by this Authority on _____

    ☐ the drawings:

    pages _____ as originally filed/furnished

    pages* _____ received by this Authority on _____

    pages* _____ received by this Authority on _____

    ☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

    ☐ the description, pages _____

    ☐ the claims, Nos. _____

    ☐ the drawings, sheets/figs _____

    ☐ the sequence listing *(specify)*: _____

    ☐ any table(s) related to the sequence listing *(specify)*: _____

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

    ☐ the description, pages _____

    ☐ the claims, Nos. _____

    ☐ the drawings, sheets/figs _____

    ☐ the sequence listing *(specify)*: _____

    ☐ any table(s) related to the sequence listing *(specify)*: _____

    *   *If item 4 applies, some or all of those sheets may be marked "superseded."*

Form PCT/IPEA/409 (Box No. I) (January 2004)

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	4-7	YES
	Claims	1-3 8-10	NO
Inventive step (IS)	Claims	6	YES
	Claims	1-5 7-10	NO
Industrial applicability (IA)	Claims		YES
	Claims		NO

2. Citations and explanations (Rule 70.7)

Prior-art

In the International Search Report the following documents are cited:

D1: Lei Sai-Weng el al., "Performance analysis of adaptive interleaving of OFDM systems", May 2002
D2: US2002044612 A1
D3: EP0980162 A1
D4: WO9907076 A2
D5: Daniel J. Costello et al, "New Classes of Algebraic Interleavers for Turbo-Codes"

Document D1 describes, among other things, a normal interleaving operation, where a row vector of information bits is permuted according to an interleaving matrix (see page 436 Chapter III column 1, approx. line 29- column 2, approx. line 23).

A normal interleaving/de-interleaving operation could also have been shown from documents D2-D4.

The document D5 discloses a new class of algebraic interleavers for Turbo Codes, wherein an index mapping function can be expressed as an ordered set called the permutation vector and wherein the permutation vector is shifted. Note, the applicant has not had a chance to comment on this document.

.../...

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of: Box V

Statement of reason

The single general concept
The single general concept is to solve the problem relating to a new physical layer (Flexible Layer One) for the GSM/EDGE Radio Access Network. The newly proposed layer enables transmission of 58 bits compared to the previous 57 and a new block size of 464 bits compared to the previous 456 bits, this creates problems for the diagonal interleaver that is built for the old block sizes. The interleaver would, with the new block sizes, in some situations overwrite the interleaved bits. The problem is solved by introducing a shift, when an overwrite situation would occur, in the old diagonal interleaving formula, see formulas 4 and 5.

In general
The independent claims are vague and unclear and lack the necessary technical features to distinguish the independent claims from the prior art, see Box VIII.

Claims 1-3 and 9
The method and apparatus according to claims 1-3 and 9 describe a process in a transmitter where information bits are assigned with an index and where the interleaving comprises computing the position of the information bits such that the values of the index of the information bits are modified according to a shift term. The sum of the index number of each information bit and the shift term forms the modified index of the information bits.
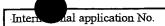
The examiner considers the method and apparatus described above, as nothing but a description of a normal interleaving process where information bits are interleaved according to an interleaving matrix.

Normal interleaving includes information bits being assigned indexes and according to an interleaving matrix the information bits are shifted, i.e. the information bits are assigned a new index according to the sum of the original index plus a shift coming from the interleaving matrix, see for example D1 page 436 first column line 29- second column line 24.
Therefore, the method and apparatus according to claims 1-3 and 9 lack novelty.

.../...

Form PCT/IPEA/409 (Supplemental Box) (January 2004)

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:

Claims 4-5 and 7

The methods according to claims 4-5 and 7 are considered as constructional details. Therefore, the methods according to claims 4-5 and 7 lack an inventive step.

Claims 8 and 10

The method and apparatus according to claims 8 and 10 describe very briefly a process for de-interleaving, where it is determined if the indexes assigned to the information bits have been modified. Based on the determination, the de-interleaving of the information bits is either based on modified values of the indexes or originally assigned values of indexes.

The claims describe nothing but a normal check if interleaving has been done on the transmitter side, i.e. the indexes of the information bits are either modified or not.

Therefore, the method and apparatus according to claims 8 and 10 lack novelty.

To further stress that claims 1 and 8-10 lack novelty document D5 has been added. Document D5 discloses an interleaver with an index mapping function, i.e. a permutation vector, wherein the permutation vector is shifted, i.e. the indexes are modified, see D5 Example I.1 and Theorem I.2.

Box No. VIII   Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

Claims 1 and 8-10

The independent claims 1 and 8-10 are considered vague and unclear, since the independent claims fail to specify what they mean with an "index". Therefore, the present independent claims can now be seen as a normal interleaving operation, a normal interleaving operation which includes modification of the incoming information bits.

Further, the examiner considers it necessary that the independent claims specify when the indexes are modified, since the applicant has not invented a shift in an index that is applicable in all situations. According to the description page 4 line 29-page 5 line 14, the indexes are modified when an overwrite situation would occur in the new flexible layer one in the GSM/EDGE system.